our cloistered world within the college walls.

Let us come among our fellows not as doctors gowned and coped, but as the simple men and women that we are, seeking advice and aid more often than we can impart knowledge or develop wisdom. Realizing as we do that could we but exchange the known for the unknown, the little that science has achieved would appear contemptible. From the frontiers of our culture we gaze into the vast unknown, but it is but little that we can see.

Our science is not alone the concern of specialists but of every man and woman of our land and with the advent of modern medicine, antiseptic surgery, and a knowledge of the law of heredity, great human problems have arisen.

We now stand as trustees guarding things of vast import for good or evil. The very word eugenics conjures up problems for the wisdom of humanity to solve. These problems of science have shaped themselves from out the mists of doubt and lie as awful things upon our path, yet the higher the precipices the safer the harbor they enclose, and we await the wisdom of the wisest to guide us.

These are things too deep for the mere scientist, they are for each and every one of us, and the investigator is but one with the vast public in giving heed to their solution.

Yet in a deeper, more far-reaching sense, our association has a mission humanity-wide in its embrace, and as the duel has ceased to be respectable among individuals, so let war come to be regarded among the nations. It is with no boasting of virtue that we men of science of America can take this stand. We must speak as sinners pleading with sinners. Let us not forget that militarism has been in our own land as well as elsewhere. Let us remember that every generation of Americans has drawn the sword, and that the most prolonged and devasting conflict of the nineteenth century was waged on our own soil over a question which Great Britain solved through a simple act of Parliament.

The light of civilization has glorified the summit of our ideal but the vast mountain below has forever remained dark in the barbarism of the savage. Our new-born love of all humanity is superimposed upon ages of distrust, prejudice and hatred born of ignorance, but let us recognize that the spark of kindliness that seems so small to-day is ours at least to foster until true to its destiny it shines as a blessing to all future generations of our earth.

To effect these things what better body can there be than the men of science of the nations of the earth acting in cooperation with that vast multitude of our fellows from whom we have received the blessed opportunity to labor and to serve.

The problems of our fathers' day were trivial compared with these. Let us therefore be true to the old ideals of our American Association, and let it forever stand for *association* in terms of mutual helpfulness between our public and our men of science.[1]

Alfred G. Mayer

AID TO ASTRONOMICAL RESEARCH

The experience of the Rumford, Elizabeth Thompson and certain other research funds shows that great returns may be obtained from relatively small grants to suitable persons. Owing to the excellent organizations resulting from the large sums given to astrophysics in this country, astronomers are well qualified to secure such results. Accordingly, the follow-

[1] Dr. Mayer devoted the remainder of the evening to an account of the research work of the Tortugas Laboratory of the Carnegie Institution of Washington illustrated by colored lantern slides.

ing letter was sent, and the replies are given below in the order in which they were received.

My Dear Sir: The greatest return in astronomical output, for a given expenditure, in my opinion, could be obtained by moderate grants to leading astronomers. I am accordingly sending copies of this letter to twelve of the American astronomers who would, it seems to me, make the best use of a grant of one thousand dollars a year for five years. I want to publish these needs and then see if the money can be obtained. Are you inclined to make me a statement of about one hundred words showing how you would apply such a grant? I give below my own statement as an example.

Yours very truly,

EDWARD C. PICKERING

Statement

The New Draper Catalogue will fill eight quarto volumes of the Harvard Annals, and will give the class of spectrum and magnitude of two hundred thousand stars, or more. Miss Cannon has nearly completed the observations, but publication could be greatly expedited by the employment of an additional assistant at an annual salary of five hundred dollars. Another extensive research on the photographic brightness of the stars by Miss Leavitt, could be equally advanced in the same way. In carefully organized routine work a great increase in efficiency may be obtained by the use of such assistants.

Professor C. L. Doolittle desires $500 to $1,000 for publication of results already obtained.

Professor E. W. Brown approves of the determination of the position of the moon by photography as described below by Professor Russell, and suggests a determination of the lunar parallax by a similar method.

Professor F. Schlesinger states that a very efficient method for cataloguing stars by means of a photographic doublet has been developed at the Allegheny Observatory during the past few months. This is being applied to a zone four degrees wide at the celestial equator. We have been urged by astronomers here and abroad to extend this work to other parts of the sky. A grant of $1,000 per annum continued for about twelve years would enable us to cover nearly the whole northern sky in this way. Among other things, this work would help materially the progress of the great Astrographic Catalogue, and would increase its value. If the same work were done by the earlier and ordinary methods it would cost not less than ten times as much and would be far less accurate.

Professor S. A. Mitchell states that the Leander McCormick Observatory has undertaken as its principal work the photographic determination of stellar parallax, an important research to which the 26-inch telescope is excellently adapted. The income of the observatory for the payment of all salaries (except the director's), for maintenance, and for improvements is less than $1,500 per year. The award by Columbia University of the Adams Research Fellowship for the present year has made possible a much needed increase in staff. One thousand dollars per year would permit the continuation of parallax work, and would also allow expansion along visual lines and in photometric work.

Professor F. Slocum states that the Van Vleck Observatory will be finished during the summer of 1915. The principal instrument will be a new 18½-inch Clark refractor. The mounting and clock work will be made by Warner and Swasey. The observatory is to be used by classes in astronomy of Wesleyan University, but it is the intention of the director to devote as much time as possible to research. The chief feature of the proposed program will be systematic observations for the determination of stellar parallaxes. The midnight hours, when parallax factors are small, will probably be used for micrometric or photometric observations. An assistant at $1,000 per year to share in making the observations and to carry out the routine work of computation would greatly increase the efficiency of the observatory.

Professor E. B. Frost states that up to the end of 1913, 5,100 stellar spectrograms had been obtained with the Bruce spectrograph of the Yerkes Observatory for the purpose of determining the velocity in the line of sight of northern stars, chiefly of spectral types *B* and *A*, brighter than magnitude 5.5. Of

these spectrograms it has thus far been possible to measure only 2,740, or 54 per cent., owing to a lack of assistance in this work. For 1910–13 the percentage measured is 48. With an additional $1,000 per year for five years, additional assistants could be obtained so that these arrears of measurement could be made up and this program of work completed.

Professor H. N. Russell states that the photographic determination of the position of the moon at Princeton University Observatory, from plates taken at Harvard and measured here, has given results probably more accurate than any previous method of observation. The provision of a salary of five hundred dollars a year for a computer will enable the continuation of this work, which must otherwise be interrupted. An equal sum would provide a computer to work on eclipsing variable stars. Material for accurate light curves and elements of about one hundred of these systems, as yet uninvestigated, is contained in the Harvard photographs. The results regarding the density, surface brightness, and other characteristics of the stars would be of great astrophysical importance.

Professor J. A. Miller states that the energies of the observing staff of Sproul Observatory are largely devoted to research and stellar parallax work. "With such a grant as you propose at my disposal, I should employ two assistants, one at $500 per year to do the routine detailed work connected with a research of this sort; the second to aid in the measures and final reductions of the plates. I should have to pay the second assistant $800 per year, the difference between the $500 that you propose and the $800 to be paid by the observatory. I could thus materially increase the quantity of our parallax output without in any way affecting its quality. In addition, this would enable us to utilize our present equipment (without any additions whatever), more nearly to its full capacity, by extending our work into closely allied fields."

Professor J. Stebbins states that for the past few years the work of the University of Illinois Observatory has been the development of an electrical method for the measurement of the light of stars. "As the work is quite new, we must do a considerable amount of experimenting in the laboratory with the object of increasing the accuracy of observations at the telescope. These investigations are all carried on in addition to the regular instruction which must be done at a university observatory. We have some untrained student assistants, but if we could get the services of a regular man and keep him year after year, our scientific output would be greatly improved and increased. It is very probable that after a certain time the university will be able to put such a research position upon a permanent basis."

Professor G. C. Comstock states that the Washburn Observatory is engaged in determining the positions of several thousand stars, averaging about seventh magnitude, to be utilized in an extension of Boss's Preliminary General Catalogue. Progress of this work is greatly hindered by entire absence of a computing staff. One or more computers are sorely needed. A grant of $1,000 for a single year would be of value in this connection but such a grant continuing over five years would be much more than five times as useful since at the outset much time is necessarily given to training the computer to his work. His efficiency increases with experience.

Professor Philip Fox states that the most pressing need of the Dearborn Observatory is in the line of measurement of the many plates we have taken for the determination of stellar parallax, and the reduction of these measures. The series of plates now has reached 948, and is being added to at the rate of about ten plates on every clear evening. Additional help for this work would greatly expedite its progress.

Professor W. W. Campbell states that the greatest return which the Lick Observatory can make for a small additional expenditure would come from the employment of a very capable observer to assist with the spectrographs attached to the thirty-six-inch refractor and to the Crossley reflector. The demands

upon such an observer are very severe because the apparatus is extensive and complicated, and skilled and constant care must be devoted to the observations. Such services usually begin to be satisfactory about two months after the start is made, and their value increases through many years. The salary of such an assistant should be $1,000 for the first year and there should be an increase of $100 each year until $1,500 is reached.

An unexpected result was that in nearly every case, the principal need proved to be for assistants. Some preferred one experienced observer, others two computers. In some cases, it is believed that if the work were once started it would be continued by the university. An astronomer can often direct one or two assistants so that they will obtain as accurate results as if he devoted the same time to the work himself. A small appropriation may thus double the output of his observatory.

My own application is included since I believe that as important results can be obtained here as elsewhere, but if all can not be provided for, I recommend that other astronomers having fewer assistants should receive precedence. Even if only a portion of the sum asked for could be provided, it is probable that an extraordinary relative output would be obtained. It is hoped that, in some cases, those interested in a particular observatory may be willing to supply its needs.

EDWARD C. PICKERING

December 21, 1914

FRANCIS HUMPHREYS STORER

FRANCIS HUMPHREYS STORER, of the Massachusetts Institute of Technology and later of the Bussey Institution of Harvard University, was born March 27, 1832, and died July 30, 1914. His father was David Humphreys Storer (M.D., LL.D.) and his mother was Abby Jane (Brewer) Storer. He married Catherine A. Eliot, sister of Charles W. Eliot, June 21, 1871.

Professor Storer studied at the Lawrence Scientific School in 1850–51. He was assistant to Professor Cooke in 1853. He received from Harvard University the degree of S.B. in 1855 and the honorary degree of A.M. in 1870. From 1855 to 1857 he studied abroad and from 1857 to 1865 he practised as a chemist.

The writer knew him intimately from 1865 to 1870 when he was professor of general and industrial chemistry in the Massachusetts Institute of Technology and the writer was his pupil. In that year he resigned his position to become professor of agricultural chemistry in the Bussey Institution; the next year he became dean, an office which he held until he withdrew in 1907.

Professor Storer's pupils say of him that he was the best of teachers of chemistry. He and Professor Eliot were the pioneers in introducing the experimental method of giving instruction to classes in chemistry, and those who were ripe for it found in it the greatest inspiration. He was uniformly genial and had a great faculty of imparting his knowledge that was thoroughly interesting to his students. He possessed one of the most fascinating personalities of our day. Professor Rogers and Professor Storer were the two most inspiring teachers we had in the early days of Technology. Many of the pupils owe their absorbing interest in science to these two strong characters. In those days there were members of the faculty who were in favor of letting the students obtain the degree too easily; Storer was foremost in opposing this laxity, and insisted on the highest possible standard. He was a thorough teacher and a gentleman of high culture. He had a human side too, which endeared him to his pupils. On one occasion when an expedition was arranged to visit the coal mine in Rhode Island, all the party had arrived at the train and were excited and anxious because Eli Forbes had not turned up. At the last minute he appeared and stepped aboard as the train started and Storer remarked "and here is Eli the most prompt of us all."

All agree that his loss to Technology in 1870 was a severe one to that school.

Of his connection with the Bussey Institution it may be said he was always very ready